Vol. 21 No. 1 January 1999

Design and evaluation of a research-based teaching sequence: the superposition of electric field
L. Viennot and S. Rainson 1

Teaching fluids: intended knowledge and students' actual conceptual evolution
D. Psillos and P. Kariotoglou 17

RESEARCH REPORTS

Conceptual change in science through collaborative learning at the computer
Ping-Kee Tao and R. F. Gunstone 39

One class, many worlds
W.-M. Roth, S. Boutonné, C. J. McRobbie and K. B. Lucas 59

The role of anomalous data in restructuring fourth graders' frameworks for understanding electric circuits
D. P. Shepardson and E. B. Moje 77

Mental models of electricity
A. T. Borges and J. K. Gilbert 95

Vol. 21 No. 2 February 1999

Children's alternative views: alternative to what?
Marilyn Fleer 119

RESEARCH REPORTS

Biotechnologies as a context for enhancing junior high-school students' ability to ask meaningful questions about abstract biological processes
G. Olsher and A. Dreyfus 137

Why teach primary science? Influences on beginning teachers' practices
Ken Appleton and Ian Kindt 155

Scope, sequence and coordination: The Iowa Project, a national reform effort in the USA
Robert E. Yager and Jeffrey D. Weld 169

Procedural and conceptual knowledge of expert and novice students for the solving of a basic problem in chemistry
Rex M. Heyworth 195

The Flexible Learning Approach to Physics (*FLAP*): a review after the first two years
M. H. Tinker, R. J. A. Lambourne and S. A. Windsor 213

Science education in Uganda: progress and possibilities
Thomas R. Black, Denis Atwaru-Okello, Julie Kiwanuka, Debra Serwadda, Olive Birabi, Florence Malinga, Albert Biumigishu and Alastair Rodd 239

Vol. 21 No. 3 March 1999

Response and scoring models for the 'Views on Science–Technology–Society' instrument
Ángel Vázquez-Alonso and Maria-Antonia Manassero-Mas 231

Standards for cultural contextualization of interpretive research: a Melanesian case
Bruce G. Waldrip and Peter C. Taylor 249

The use of the Principle of Relativity in the interpretation of phenomena by undergraduate physics students
Maurício Pietrocola and Arden Zylbersztajn 261

From scientists' and inventors' minds to some scientific and technological products: relationships between theories, models, mental models and conceptions
Creso Franco, Henrique Lins de Barros, Dominique Colinvaux, Sonia Krapas, Glória Queiroz and Fátima Alves 277

On the development and evaluation of a shell for generating science performance assessments
Guillermo Solano-Flores, Jasna Jovanovic, Richard J. Shavelson and Marilyn Bachman 293

RESEARCH REPORTS

Interpreting popular reports of science: what happens when the reader's world meets the world on paper?
Linda M. Phillips and Stephen P. Norris 317

The representation of science–technology relationships in Canadian physics textbooks
Paul L. Gardner 329

Vol. 21 No. 4 April 1999

RESEARCH REPORTS

Girls' participation in physics in single sex classes in mixed schools in relation to confidence and achievement
Eileen Gillibrand, Peter Robinson, Richard Brawn and Albert Osborn 349

Photosynthesis and 'inverse respiration' in plants: an inevitable misconception?
Pedro Cañal 363

The use of a problem-solving-based instructional model in initiating change in students' achievement and alternative frameworks
Chun-Yen Chang and James P. Barufaldi 373

A quantitative study of the differences in ideas generated by three different opportunities for classroom talk
Julian Swain, Martin Monk and Sally Johnson 389

Self-assessment: the use of self-report knowledge and opportunity to learn inventories
Pinchas Tamir 401

Perceptions of the water cycle among primary school children in Botswana
A. A. Taiwo, H. Ray, M. J. Motswiri and R. Masene 413

Concept cartoons, teaching and learning in science: an evaluation
Brenda Keogh and Stuart Naylor 431

Topics and manner of talk in undergraduate practical laboratories
J. Tapper 447

Announcement 465

Vol. 21 No. 5 May 1999

RESEARCH REPORTS

Attitudes to wetland restoration in Oxfordshire and Cambridgeshire, UK
Donna Rispoli and Clive Hambler 467

Exploring a hydrological concept through children's drawings
J. E. Dove, L. A. Everett and P. F. W. Preece 485

Global environmental priorities of secondary students in Zabrze, Poland
Michael Robinson and Piotr Kaleta 499

Spontaneous concept maps aiding the understanding of scientific concepts
Virpi Slotte and Kirsti Lonka 515

Same destination, different journeys: a comparison of male and female views on becoming and being a scientist
Rebecca M. Monhardt, John W. Tillotson and Peter D. Veronesi 533

The place of argumentation in the pedagogy of school science
Paul Newton, Rosalind Driver and Jonathan Osborne 553

Vol. 21 No. 6 June 1999

RESEARCH REPORTS

An investigation into the role that school-based interactive science centres may play in the education of primary-aged children
Chris Rix and Jacqueline McSorley 577

Phasing science InSET in developing countries: reflections on the experience of the Primary Science Programme in South Africa
Stephen Harvey 595

Challenges to meaningful learning in African–American females at an urban science high school
Phyllis Baudoin Griffard and James H. Wandersee 611

Gender preferences in learning science
Rae Stark and Donald Gray 633

Students' reasoning about chemical reactions: what changes occur during a context-based post-16 chemistry course?
Vanessa Barker and Robin Millar 645

Using metaphor to probe students' conceptions of chemistry learning
Gregory P. Thomas and Campbell J. McRobbie 667

Comparison of student learning about diffusion and osmosis in constructivist and traditional classrooms
Roger G. Christianson and Kathleen M. Fisher 687

Vol. 21 No. 7 July 1999

INTRODUCTION

Editorial. Special Issue: The public understanding of science: implications for education
Roger T. Cross 699

RESEARCH REPORTS

School science, citizenship and the public understanding of science
E. W. Jenkins 703

Public understanding of science as a separate subject in secondary schools in The Netherlands
Wobbe De Vos and Jurrie Reiding 711

Towards the reform of science teaching in Spain: the social and personal relevance of junior secondary school science projects for a socially responsible understanding of science
Pedro Membiela 721

The emergence of global thinking among American and Russian youth as a contribution to public understanding
Jack Hassard and Julie Weisberg 731

Students' argumentation in decision-making on a socio-scientific issue: implications for teaching
Tasos Patronis, Despina Potari and Vassiliki Spiliotopoulou 745

School science and public understanding of science
Peter J. Fensham and Wynne Harlen 755

Public understanding of science: using technology to enhance school science in everyday life
Fernando Cajas 765

The social responsibility of science and the public understanding of science
Roger T. Cross and Ronald F. Price 775

Announcement 787

Vol. 21 No. 8 August 1999

RESEARCH REPORTS

Students' understanding of the co-ordination of theory and evidence in science
John Leach 789

Emirates pre-service and in-service teachers' views about the nature of science
Abdullateef H. Haidar 807

A comparison of primary school pupils' ability to express procedural understanding in science through speech and writing
Paul Warwick, Rachel Sparks Linfield and Philip Stephenson 823

Workshop tutorials: accommodating student-centred learning in large first year university physics courses
Manjula D. Sharma, Rosemary Millar and Suman Seth 839

Sociocognitive roles in science group discourse
Kathleen Hogan 855

Cognitive acceleration through science education II: its effects and scope
Michael Shayer 883

Vol. 21 No. 9 September 1999

RESEARCH REPORTS

Structural patterns in students' conceptions in mechanics
José Mª Oliva 903

Use of a computer simulation to develop mental simulations for understanding relative motion concepts
James M. Monaghan and John Clement 921

University science students' experiences of investigative project work and their images of science
Jim Ryder and John Leach 945

How Korean students see scientists: the images of the scientist
Jinwoong Song and Kwang-Suk Kim 957

The gender gap and discriminating power in the National Curriculum Key Stage three science assessments in England and Wales
Peter F. W. Preece, Nigel C. Skinner and Robin A. H. Riall 979

Feminisms and science education: one science educator's exploration of her practice
Sharon Parsons 989

Opportunities for sex education and personal and social education (PSE) through science lessons: the comments of primary pupils when observing meal worms and brine shrimps
Sue Dale Tunnicliffe and Michael J. Reiss 1007

Vol. 21 No. 10 October 1999

RESEARCH REPORTS

A writing in science framework designed to enhance science literacy
Brian Hand 1021

The value of bilingualism in pupils' understanding of scientific language
John Kearsey 1037

Students' knowledge construction in small groups in the seventh grade biology laboratory: Verbal communication and physical engagement
Hsiao-Ching She 1051

Using words about thinking: content analyses of chemistry teachers' classroom talk
Janice M. Wilson 1067

Evaluation of abilities in interpreting media reports of scientific research
Mary Ratcliffe 1085

Growth patterns in students' ability to supply scientific explanations: findings from the Third International Mathematics and Science Study in Israel
Ruth Zuzovsky and Pinchas Tamir 1101

Vol. 21 No. 11 November 1999

RESEARCH REPORTS

Primary student teachers' conceptions of the nature of science
Karen Murcia and Renato Schibeci 1123

Teachers' knowledge of models and modelling in science
Jan H. Van Driel and Nico Verloop 1141

Indian secondary students' understanding of different aspects of health
Bakhtaver S. Mahajan and Sugra Chunawala 1155

Empirical evaluation of an educational conservation programme introduced in Swiss secondary schools
Franz X. Bogner 1169

Students' understandings about animal skeletons
Sue Dale Tunnicliffe and Michael J. Reiss 1187

The progression toward constructivist epistemological views of science: a case study of the STS instruction of Taiwanese high school female students
Chin-Chung Tsai 1201

Vol. 21 No. 12 December 1999

RESEARCH REPORTS

A biological basis for generative learning in technology-and-science Part I: A theory of learning
Lynette Schaverien and Mark Cosgrove 1223

An investigation into chemical engineering students' understanding of the mole and the use of concrete activities to promote conceptual change
Jennifer M. Case and Duncan M. Fraser 1237

Non-science oriented students and the second law of thermodynamics
Ruth Ben-Zvi 1251

An investigation of the effectiveness of computer simulation programs as tutorial tools for teaching population ecology at university
K. Korfiatis, E. Papatheodorou, G. P. Stamou and S. Paraskevopoulous 1269

As 'process' as it can get: students' understanding of biological processes
Judith Barak and Malka Gorodetsky 1281

Secondary pre-service teacher education in Ethiopia: its impact on teachers' competence and confidence to teach practical work in science
S. A. Bekalo and A. G. Welford 1293

A comparative study of attitudes to the aims of practical work in science education in Egypt, Korea and the UK
Julian Swain, Martin Monk and Sally Johnson 1311